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HOME PROJECT SERIES

CORN GROWING

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CORN GROWING

A MANUAL FOR CORN CLUBS

BY

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PREFACE

Whatever may be the status of the project system of teaching other subjects, it is coming to be quite generally believed that the home project offers one of the best methods for teaching elementary agriculture. The essentials of the home project plan are as follows: (1) a definite, detailed plan for work at home covering a season, or a more or less extended period of time; (2) it must be a part of the instruction of the school in agriculture; (3) the parents and pupil should agree with the teacher upon the plan; (4) the home work must have competent supervision; (5) records and reports of time, method, cost and income must be honestly kept and submitted to the teacher.

In the study and practice of a vocational subject such as agriculture, we may distinguish three aspects, each involving distinct pedagogical characteristics and special problems of administration. The first includes the concrete, specific, or practical work, such as the actual making of a garden, the raising of poultry, or the growing of corn; the second involves a study of such technical sciences as botany, physics, chemistry, and the principles of the agricultural science relating directly to the subject of agriculture under consideration; the third aspect includes such general information as the history, economic values, and other interesting facts of that particular phase of agriculture being studied. Doctor Snedden states in his "Problems of Secondary Education," that the keynote of the newer

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education in these fields is to be found in the development of facilities for obtaining practical experience, under conditions as nearly approximating those of the actual vocation as can be obtained.

It is for the purpose of making as practical as possible some of the principles of scientific agriculture for the boys and girls of the public schools, and to give direct vocational value to such work that this little book, the first of a series, was prepared. The plan is to outline one project in each booklet, supplying the project directions, practical exercises for laboratory work, subject-matter for study and recitation, and notebook forms for accounts and records. The school work in elementary agriculture for a year could well be based upon one or two of these projects, and the boys and girls doing the work should be organized into a club and affiliated with the State Boys and Girls Club movement through the state leader, usually located at the State College of Agriculture.

—THE AUTHORS.

To the Teacher

With our changing social conditions, new duties, formerly delegated to the home, have been thrust upon the school. This has led to the introduction of some "real life" subjects into the curriculum, among them agriculture. It is not possible, however, to get the desired results in teaching agriculture by using the same methods used in teaching other subjects. The teacher who attempts to teach agriculture alone and unaided in the schoolroom has not only shouldered a heavy burden but is not making the most of an opportunity.

The business of the school is to help to develop men and women of the right sort, not merely to teach boys and girls reading, writing, and arithmetic. If agriculture is to justify its place in the curriculum, it must contribute something more than mere facts.

The farmer of yesterday was an individualist. He went his way, alone. The farmer of tomorrow will work in a group. As a member of a farm bureau, or coöperative association, he will buy and sell in coöperation with his neighbors. Today he is not altogether convinced of the necessity of such coöperation. The next generation must learn it. The home project club work should teach lessons of thrift, application and perseverance, as well as of agriculture. The club members will learn the benefits of group effort, and as the farmers of tomorrow will be prepared to take part in the great agricultural movements.

The teacher who uses this method to teach agricul-

ture will not only lighten his burden by making every home and farm a schoolroom, and every parent an assistant, but he can, in part, meet the argument that the average rural teacher is unprepared to teach agriculture. Every community contains men who can help to teach agriculture. They need to be discovered and given direction. The teacher cannot be a specialist in the treatment of all of the ills, social and economic, to which the countryside is heir, but in his capacity as leader he can seek out those who do know.

No method or plan can take the place of a good teacher and most teachers will use their own methods of carrying out the details of the club work. The following suggestions may prove helpful. An advisory committee of three or more patrons who are corn growers will be of great assistance. The approval and consent of the parents of every pupil should be secured and facilities for work at home promised. Trips to neighboring farms may be taken by an entire school.

Every school should have an "exhibition day" when school work may be inspected. Demonstrations of interesting phases of school work by the pupils themselves will prove of interest. The corn exhibit, corn stringing contests, and demonstration of testing seed corn will be welcome features of such an "exhibition day."

A resourceful teacher will think of many more ways to interest the community and motivate the work. It should be borne in mind that this little volume is not like most school books. Its contents must be more than studied. Unless put into practice on the farms of the community it will have failed in its mission.

—J. H. Greene.

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To the Pupil

We do not always like to take our school books home. But this little volume is not like a regular school book. It has a place in your home as well as in your desk at school.

Perhaps your father or some neighbor has a set of farm books and keeps track of how much his corn ground "brings in" and how much it costs to fatten his hogs.

In following out the plan of this little book, you are farming for yourself, in a small way, and keeping a set of books. At the end of the season you will know your exact yield and how much it cost to raise your crop.

But besides learning about this big business of raising corn, you will be learning some other things that are useful in life. Success is not measured by the number of things that you start but by the number of things that you finish. The summer may be hot, other work may press, but if you "stick to your job" you will not regret it when fall comes. You will get in the habit of not giving up. Remember that drought or beating rains affect the farm of one hundred and sixty acres as well as your own of one acre.

Accuracy is a valuable habit to acquire. Be sure that your notes and records are accurate. Mistakes may not mean much now but may cost you money

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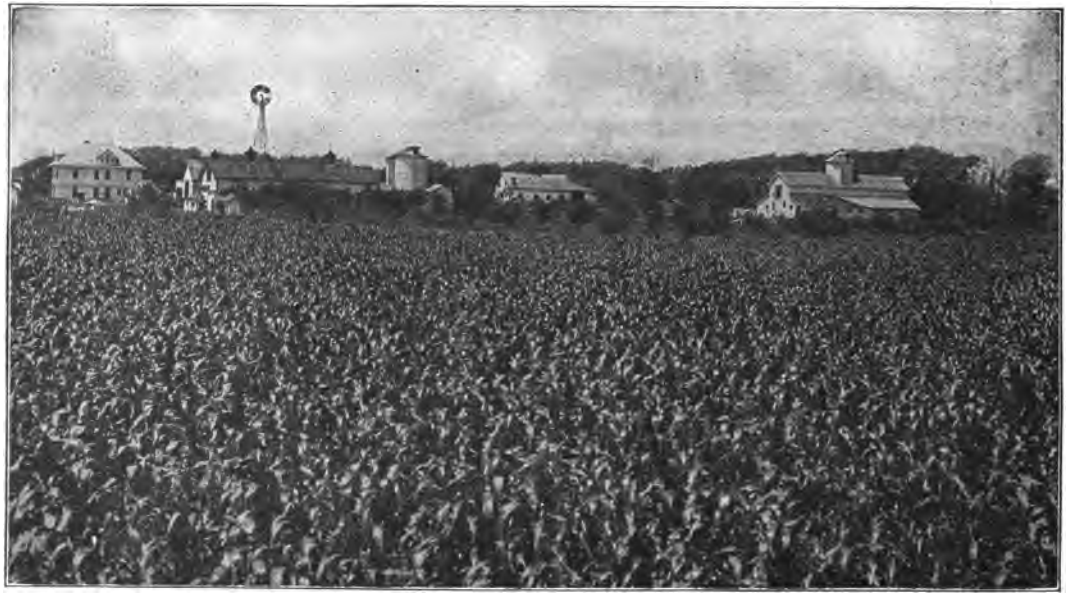
some day. Remember, too, that a boy or girl who is trying to learn never wants for help or friends. The state club leader at your agricultural college, your county agent and county superintendent of schools, as well as your parents and teachers, are all interested in you and want to help you succeed. Good luck!

—J. H. Greene.



An Indiana Farm Home

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PART ONE

CORN PROJECT CALENDAR

September

1. **Organization of the club.** See plans in the appendix. The class in Agriculture, undertaking to base its year's work upon the home project, should be organized as directed by the club plan. Each member of the class should become a member of the club and plan to do all the work outlined for the project. Of course the plan should meet with the approval of the board of education and of the parents of the boys and girls undertaking the project, and have the hearty support of the county superintendent of schools and of the teacher. The State Club Leader at the State College of Agriculture should be notified of the organization of the club so that he can send enrollment blanks and all such literature and publications as will be helpful in the progress of the work.

2. **Selecting the plot.** For the corn growing project we may well begin operations in September for the next season's crop. The first thing each pupil should do after the organization of the club is to select the plot upon which he is to grow his corn. Not less than an acre should be used for this project. It is to be hoped that the father will allow the boy an acre of good, well-drained, fertile land upon which to grow his corn.

3. **Notebook records.** Each pupil should keep a neat and accurate record of all operations, results and accounts, month by month, on the record pages provided at the end of this book, so that when the project is completed the pupil will have an agricultural booklet he will be proud to exhibit. Throughout the notebook work, pictures relating to the project may be sketched or pasted in as the tastes and abilities of the pupil incline. From time to time suggestions for the notebook work will be made in this calendar.

4. **The corn plot.** Draw a map, to scale, of your proposed acre of corn ground. Copy this neatly in your notebook. Write the following information regarding your plot of land:

(a) Location.

(b) Type of soil: sandy, clay, loam, upland, lowland, etc.

(c) Cropping and treatment of the plot for the last three years.

(d) Present conditions as to plant growth and fertility.

(e) Drainage.

(f) Estimated value of the acre of land.

5. **Selecting seed.** Attention may well be given this early in the project to the selection of the seed corn for next spring. Send to the various seed corn breeders of your state for their circulars; also to the International Harvester Company and to the State College of Agriculture for bulletins on seed corn.

Go into the field and study good types of stalks and ears from which seed corn should be selected. (Laboratory exercises on this subject may precede this trip.) Become thoroughly familiar with the ideal stalk and

1. An Ideal Stalk and Ear

ear which should be selected when the time for husking the seed corn comes.

October

1. **Storing seed corn.** Devices for storing seed corn should be planned and made this month. Each pupil should make definite provision for storing his seed corn in some of the various types of racks or devices referred to under the discussion of this project.

2. **Field selection of seed.** Before freezing weather or severe frosts, the seed corn to be used in this project should be selected in the field and brought in for drying and storing.

The only satisfactory way of selecting seed corn is in the field where one can take into account the whole plant. The ear should be taken from a leafy stalk that is well developed, standing at proper distance from other stalks and grown under normal conditions. It should be supported about midway up the stalk on a short shank inclined slightly downward. Desirable ear characteristics are given in standard score cards. Since the pupil is to select for only a small planting area, great care should be taken to select and store the best seed corn possible. Determine the number of ears required to plant an acre of corn. Select several times this number for storing.

Dry cellars, basements or attics, if free from mice and rats, may be used for storing corn. The old practice of hanging seed corn from rafters is a good one to use until the corn is finally stored for the winter. Corn contains considerable moisture, the germ is a living thing, and the vitality of the corn may be seri-

ously injured if it is allowed to freeze. Record in notes: (1) Amount of seed selected. (2) Where obtained. (3) Variety of corn. (4) How stored.

3. **Soil treatment of the plot.** Attention should be given this fall to the proper treatment of the soil of the plot to be planted. If a clover crop has been growing to be plowed under, it would be a great advantage. In any case, an application of five or six tons of farm manure should be applied to the acre. Most soils are deficient in phosphorus, and there would likely be beneficial results from applying about one ton per acre of finely ground raw rock phosphate. The whole crop's residue, clover, manure, and rock sulphate, should be plowed down this fall to decompose and become available for plant food for the corn crop of next season.

We must be sure that the soil is not sour. Get some blue litmus paper at the drug store. Make up a moist ball of the soil and insert the litmus paper. If after five or ten minutes the litmus paper turns pink or red we have evidence that the soil is acid. Limestone corrects acidity, and if the soil of the proposed plot is acid, from two to three tons of ground limestone should be applied to the land and disked in after the fall plowing.

The pupil should keep a record in his notebook of all that is done by way of soil treatment on his plot.

(1) What crop residue is present?

(2) How much manure applied? When?

(3) How much phosphorus applied? When?

(4) When the plot was plowed. Depth. Was the ground disked?

(5) How did you test for acidity? Was your soil sour?

(6) How much limestone applied? When?
(7) Record hours of horse and man labor necessary.

November

1. **Completing unfinished work.** Any of the unfinished work of selecting and storing seed corn or of the preparation of the ground as described for October may be finished in November. The seed corn should be stored in the racks prepared, out of reach of rats and mice, in a dry room where dampness or freezing will not occur.

2. **Practice in judging corn.** Full directions for scoring and judging corn are given under the laboratory exercises listed for this project.

3. **Preparation of club exhibits.** Details for corn exhibits are given in the later discussions of the project. The class should arrange a corn exhibit in the schoolroom, even though the corn for this first year of the project was not grown by the pupils. For the second year of the project pupils should exhibit their own corn.

December and January

1. **Class work suggestions.** No practical work directly relating to the project is necessary these months. Have recitation work based on a study of the market prices and causes of variation; systems of permanent soil fertility; crop rotation; and the place of corn in systems of grain and livestock farming. Consult daily market quotations and record prices of corn in a table prepared in the notebook.

2. **Class reports.** Class recitations and study should

be given to the subject-matter given under the discussions of this project. Consult farm papers, bulletins, and reference texts for class reports on corn growing and related problems, such as soil, weeds, insects, feeding values, and uses of corn.

3. **Laboratory work.** Laboratory exercises given for this project, relating to the above studies, may be done these months.

February

1. **Again to the land.** We may now begin to turn our attention more specifically to the plot and the next steps in the production of the acre of corn which has been planned since last September.

2. **Signboards.** One of the things each member of the class or club should do is to make and letter a signboard to mark the plot upon which the project is to be carried out. The signboard should be 12"x18", planed on one side. It should bear the name of the local or county club preceded by the word "Member," as—

MEMBER LINCOLN COUNTY CORN CLUB

The lettering may be done by means of a stencil cut from cardboard. The letters may be cut from advertisements or made by some member of the class. These are then laid on the cardboard, their outlines drawn with a pencil and the letters cut out.

3. **Testing and grading seed corn.** A rectangular box seed corn tester and as many other kinds of testers as possibly can be secured should be available for this

work. Send to your State College of Agriculture for circulars of instruction on testing seed corn. Test for germination at least fifty high scoring ears of corn selected and stored last fall in order to discover the twelve or fifteen having the most vigorous vitality to be used for planting your acre. Record the results of your testing in the notebook.—(1) When tested. (2) How tested. (3) Per cent of good germination.

2. A Seed Tester

March and April

1. **Preparation of seed bed.** If the ground has not been plowed last fall, the first preparation in the spring would be the breaking of the ground. Disking and deep plowing would be in order. If the ground has been broken last fall the plot should be disked and thoroughly harrowed in the spring. A firm, deeply plowed sub-surface, with a well-pulverized surface soil provides an ideal seed bed. Record all operations in the notebook.

(1) Was the ground plowed in the fall or spring? Why?

(2) How was your seed bed prepared?

(3) Record hours of man and horse labor used.

2. **Corn implements.** Make a study of the plows, disks, and harrows used in these operations. Record in your notes as follows:

Implements Used	The Make	Degree of Success
Plow		
Disk		
Harrow		

May

1. **Corn planting.** Corn may be planted from the first to the middle of May, or even later. From one and one-half to three inches is the depth to plant corn, depending on the character of the soil.

If the acre used in this project is a part of a larger field, the corn may be planted by the planter along with the rest of the field. If the acre is apart from other plantings the seed may be drilled or even dropped by hand.

2. **Notebook suggestions.** Record in the notebook as follows:

(a) When planted.
(b) Method used.
(c) Distance apart of rows and corn in rows.
(d) Amount of seed used.
(e) Record hours of man and horse labor used.

3. **Book study.** Study various corn planters and drills. Write a paragraph in your notebook on the advantages and disadvantages of each method of planting.

June and July

1. **Cultivation.** Weeds are kept out and the shallow soil mulch maintained in proper cultivation. Early rolling and harrowing before or soon after the corn

comes up is a good practice, facilitating the early control of the weeds.

The soil should be cultivated as often as is necessary to maintain a loose, shallow soil mulch and keep down the weeds. Never allow the surface to become baked and hard. It should be cultivated as soon after a rain as it is dry enough to work. Care should be taken not to cultivate too deep. If the roots of corn are injured, the yield is reduced.

2. **Notebook suggestions.** Record in the notebook diary as follows:

(a) Was your stand good, medium or poor?

(b) What and when was your first cultivation?

(c) Was cultivation deep or shallow?

(d) What implement was used?

(e) How many times did you cultivate?

(f) Record hours of man and horse labor used.

3. **Insect injuries.** Observe and note the insects injuring the corn:

(a) Name of insect.

(b) Nature of the injury.

4. **Weeds.** List the weeds that were troublesome.

5. **Other injury.** Was your corn damaged by any other causes?

6. **Book study.** Read and study bulletins, books and farm papers relating to corn production.

July and August

1. **Cultivation.** Continue cultivation to keep down weeds and maintain the soil mulch.

2. **Summer observations.** If the teacher or club leader is helping during the summer, frequent trips to the plot should be made by the pupil and leader to observe and discuss:

(a) Pollination and fertilization.

(b) Insect and fungous injury.

(c) Corn stand.

(d) Probable causes of success or failure in good corn growth.

Notebook records of these observations should be made. The teacher or club leader should assist the pupil in completing in a full, neat and satisfactory way all the records and accounts connected with this project.

3. **Club picnic.** A club picnic should be the closing feature of the year's work.

4. **Conclusion.** The concluding work in the notebook should be a story by the pupil on, "My Acre of Corn."

PART TWO

PRACTICAL EXERCISES

I. Study of the Corn Plant

Object. This exercise is to enable the pupil to become familiar with the parts of the corn plant and their functions.

Directions. Visit a corn field and let each pupil study the roots, stalk, leaves, tassels, and ears of the corn. Observations should be recorded in the project notebook, using the following outline:

A. **Roots**
   1. Direction of growth.
   2. Relation between moisture in ground and nearness of roots to the surface.
   3. Effect of deep cultivation.
   4. Position and function of brace roots.
   5. Show by a drawing the development of the corn roots.

B. **Stem**
   1. Division of stem into parts.
   2. Position and function of groove on side of stalk. Study position of leaves in this connection. Examine ground around the stalk after a shower, if possible.
   3. Note height and vigor of stalk.
   4. Make a drawing of the stalk.

C. **Leaves**

1. Position and arrangement of leaves.
2. Note wavy edge of leaf. This enables leaf to curl up. When does this occur? Of what use is it to the corn plant?
3. Trace the path of the rain water which falls on the leaves.
4. Show by a drawing the arrangement of the veins of a corn leaf.

D. **Tassels**

1. Note the position. At one time probably the silks and tassels were together. Of what advantage to the corn plant is the present position?
2. Note the small sacs containing pollen. Make a drawing of one.

E. **Ears**

1. Note position of ear on stalk, whether high, medium, or low.
2. Note angle it makes with stalk.
3. Are husks close or loose-fitting?
4. Number and quality of ears on stalk.

II. A Good Stalk from Which To Select Seed

Object. To bring out the points which should be considered in connection with the field selection of seed corn.

Directions. Make a study of ten or twelve stalks of checked corn or ten feet of drilled corn, noting the following characteristics of each stalk and its ears. This information is to be recorded in a table as follows:

Character	Hills or Stalks 1	2	3	4	5	6	7	8
1. No. of stalks in hill.....	..	..	..	..	..	..	..	..
2. No. of stalks bearing ears.	..	..	..	..	..	..	..	..
3. Size and vigor of stalks bearing ears	..	..	..	..	..	..	..	..
4. Height of ears	..	..	..	..	..	..	..	..
5. Ears, drooping or erect....	..	..	..	..	..	..	..	..
6. Shanks, long or short.....	..	..	..	..	..	..	..	..
7. Ears, good shape, well developed	..	..	..	..	..	..	..	..

Indicate those ears which would be suitable for seed and state your reasons for the selection.

III. Study of an Ear of Corn

Object. To learn the characteristics of a good ear of corn.

Directions. Each pupil should be supplied with an ear of corn and should rule up and fill out the following table in his project notebook:

1. Name of variety.....
2. Color of grain.....Cob.....
3. Surface, dent or flint.....
4. Rows of kernels:
   a. Number .....
   b. Straight or twisted.....
   c. Close together or wide apart.....
   d. Rows missing .....
5. Kernels, firm or loose.....
6. Shape of ear, tapering or cylindrical.....
7. Butt of ear, even, shallow or deep.....
8. Tip, exposed or covered.....
9. Kernel shape (describe shape of majority of kernels).....
   .....
10. a. Length of ear.....
    b. Circumference of ear.....

Discuss in class the requirements of a good ear and see how near this ear approaches the ideal.

IV. Study of the Corn Kernel

Object. To identify the parts of the corn kernel.

Directions. Soak some grains of corn in hot water for twenty minutes. Remove the *tip cap,* a small cap covering the end of the kernel. Begin where the tip cap has been broken and remove the hull in strips. The part immediately under the hull, covering almost all of the kernel is called the *horny gluten.* Carefully shave it off with a sharp knife. Now carefully remove the germ. Notice the size, position, and parts of the germ. The remainder of the kernel is starch, of which there are two kinds, the *horny* and the *white* starch. The horny starch lies on the back and sides of the kernel. The white starch occupies the crown end, above the germ. Make an enlarged drawing of the kernel in your notebook, showing and naming these parts.

V. Preliminary Study to Corn Scoring

Object. To become familiar with the points of a score card.

Directions. Each student should have an ear of corn, and tabulate in his notebook his observations on the ear, as follows:

	Ideal	Good	Fair	Poor
Shape of ear	.....	.....	.....	.....
Length of ear	.....	.....	.....	.....
Circumference of ear	.....	.....	.....	.....
Tip of ear	.....	.....	.....	.....
Butt of ear	.....	.....	.....	.....
Kernel uniformity	.....	.....	.....	.....
Kernel shape	.....	.....	.....	.....
Color in grain and cob	.....	.....	.....	.....
Space between kernels at cob	.....	.....	.....	.....

Space between rows.....	.....	.....	.....	.....
Vitality or seed condition....	.....	.....	.....	.....
Trueness to type.....	.....	.....	.....	.....
Proportion of shelled corn to cob	.....	.....	.....	.....

Indicate with cross (X) opposite each point the column in which you would place the point. Several ears may be used for practice, and the exercise repeated.

VI. Scoring Practice

Object. To become proficient in scoring corn.

Directions. Provide each pupil with ten ears of corn and let him practice scoring, using the score card of your state. Each pupil should score a half dozen or more ten-ear samples before this exercise is passed by.

VII. Study of the Stand

Object. To determine the per cent of stand.

Directions. Rule off a five inch square in your notebook and divide it into twenty-five, one-inch squares. Let each square represent a hill of corn. Mark off a square of twenty-five hills of corn in your plot. Record in the notebook in the proper square the number of stalks of corn with ears, and the number of barren stalks. How many stalks in this area? Using this as a basis, determine the number of stalks in the plot. Knowing the number of grains planted per hill, estimate the number planted per acre. What per cent is the number of stalks of the number of grains? This number represents the per cent of stand.

VIII. Seed Corn Racks

Object. To construct a seed corn rack.

Directions. Construct a seed corn rack according to your own ideas. Directions for the use of binder-twine and for making a simple rack follow:

Cut a piece of binding twine 12 feet long; tie the ends together thus forming a loop. Place one end of the loop over the right and the other over the left hand, holding the hands about 2 feet apart and at such height that the middle of the strands just touches the floor. Place an ear of corn in the swing thus made, with the strands 4 or 5 inches apart under the ear.

When the first ear is in place, bring the left hand, with its strand, through the strings held in the right hand and on under to the elbow of the right arm, thus crossing the strings over the first ear. Then place the second ear in the crossed strings over the first ear; withdraw the left hand; the strings will then be crossed again ready for the third ear. Repeat this operation until the end of the string is reached; then loop the shorter part of the unused string over the longer one, leaving a loop by which to hang the string of corn. Let the pupils prepare a few strings of corn to hang in the school room for Corn Day.

Another rack can be made of strips of lath as follows:

Get a bundle of plastering lath, and two boards about 4 feet long and 5 inches wide. Nail the lath strips opposite each other on the board, about 3 inches apart, so that when all are nailed on, the whole affair will stand, supported by the boards as end pieces. The corn is then laid across from one lath to the other, thus

securing free circulation of air about the ears, and allowing them to be easily handled.

IX. Seed Corn Testers

Object. To test seed corn.

Directions. Make a rag doll or box tester. The following suggestions are offered:

Rag Doll. A piece of muslin, 8 inches wide and 4 feet long, will make a tester for thirty ears of corn. Using a blue or black pencil, not indelible, draw a line down the middle and other lines across, making thirty 2½-inch squares. These are numbered and thirty ears to be tested are numbered accordingly. This may be done by means of bits of cardboard fastened to the butts of the ears with pins.

Six kernels taken from different parts of an ear are placed germ side up, in the square with a number corresponding. When all of the squares are full, a cylinder made by wiring together the opposite ends of an 8-inch square of wire screening, is placed at one end and the tester rolled up on it. String is tied at each end to keep the kernels in place. The rag doll is then immersed in warm water for eight to ten hours. It may then be removed, stood in a pan of water in which the water does not reach to the kernels and kept at a temperature of 50° to 70° F. This provides moisture and a circulation of the air.

Box Tester. A box of such dimensions as to accommodate the number of ears to be tested may be filled with sand, soil or moist sawdust. Where sand or soil is used, the squares are marked off on it. If sawdust is used a cloth with squares marked off on it must be placed over the sawdust and another cloth and more

moist sawdust over the cloth containing the grains. A glass sash over a large box will assist in retaining the moisture. An ordinary chalk box can be used to test eight ears.

Where sand is used and the box covered with glass, the grains may be lightly pressed into the soil, germ side up and the progress of the test determined from day to day without disturbing the grains.

In either case, the grains are examined at the end of ten days and those ears whose six grains have not all sprouted vigorously are discarded for seed purposes.

X. Shrinkage in Corn

Object. To demonstrate the shrinkage of corn.

Directions. Procure ten ears of corn from the field. Husk and weigh them. Record the weight and place them in a dry, safe place. At the same time weigh ten ears of corn from last year's crop. Keep these also. Weigh at intervals of two weeks. Is there a change in the weight of the new corn? Of the old corn? Determine the loss of weight and the percentage of loss. This is the shrinkage.

PART THREE

CORN, THE GREAT AMERICAN CEREAL

"The rose may bloom for England,
  The lily for France unfold;
Ireland may honor the shamrock,
  Scotland the thistle bold;
But the shield of the great Republic
  The glory of the West,
Shall bear a stalk of tasseled corn,
  Of all our wealth the best.

"The arbutus and the golden rod
  The heart of the North may cheer,
And the mountain laurel for Maryland
  Its royal clusters may rear,
And the jasmine and magnolia
  The crest of the South adorn,
But the wide Republic's emblem
  Is the bounteous golden corn."

—EDNA PROCTER.

I. HISTORY AND IMPORTANCE

Indian corn. No one knows all the history of Indian corn, whose special name is given as *maize.* The name itself contains a bit of history. Columbus found a strange plant on the island of Hayti, which the natives called "mahiz," and from this we have the name maize.

The early explorers of America found the new corn in the temperate regions of both Americas. We are particularly interested in the history of corn after the

discovery of America, because of its importance as a food crop to the early colonists. John Fiske, in his history of the discovery of America, declares that Indian corn was of "incalculable advantage to the English settlers of New England, who would have found it much harder to gain a secure foothold upon the soil if they had had to begin by preparing it for wheat and rye without the aid of the beautiful and beneficent American plant."

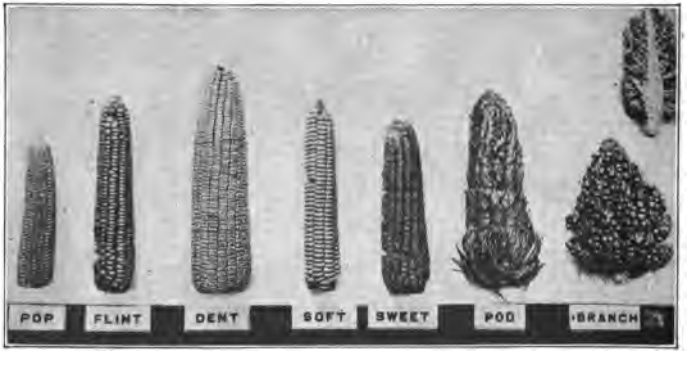
Importance of the corn crop. It is not easy to appreciate the importance of corn in the agriculture of the United States. Most people are aware of the fact that corn is our principal grain crop. Many do not know how important it is in comparison with other grain crops. The following table compiled from the estimates of the Bureau of Statistics of the United States Department of Agriculture, will furnish a basis for some interesting and instructive comparisons of the relative importance of a number of the crops for the year 1910:

Crop	Acreage	Production, Bushels	Value, Dec. 1
Wheat	49,205,000	695,443,000	$ 621,443,000
Oats	35,288,000	1,126,765,000	384,716,000
Barley	7,257,000	162,227,000	93,785,000
Rye	2,028,000	33,039,000	23,840,000
Rice	722,800	24,510,000	16,624,000
Buckwheat	826,000	17,239,000	11,321,000
Potatoes	3,591,000	338,811,000	187,985,000
Total	98,917,800	2,398,039,000	$1,339,714,000
Corn	114,002,000	3,125,713,000	$1,523,968,000

Thus it appears that, in acreage, production, and value on December 1, the corn crop of 1910 was greater than all of the other cereal grains plus the buckwheat and potatoes.

II. Types of Corn

Dent and flint. In speaking of the several types and varieties of corn, most of us use the terms rather loosely. Shoesmith in his "Study of Corn" describes six types: The *dent,* the *flint, soft corn, pod corn, sweet corn,* and *pop corn.** The types with which farmers of the corn belt have most to do are the *dent* and the *flint* corn. There are many varieties of both dent and flint types. The difference in appearance of the several types of corn is due in part to differences in structure and in part to differences in composition. In the dent type the soft endosperm appears white and starchy at the center and near the crown of the kernel. As the grain ripens this soft endosperm shrinks more



3. Seven Varieties of Corn

rapidly than the horny endosperm which is located chiefly at the edges of the kernel, and the result is the folded or wrinkled appearance of the tops of the grains of dent corn. In the flint corn, the soft endosperm in

*A new type, the branch corn, has been developed but as yet has no commercial significance.

the center of the grain is surrounded by the horny endosperm, so that the ripening grain shrinks almost uniformly, leaving a smooth shining surface.

Varieties. Some standard varieties in the corn belt are: Boone County White, Funk's Yellow Dent, Leaming, Minnesota No. 13, Reid's Yellow Dent, Silver Mine, Silver King (Wisconsin No. 7), and Johnson County White. Descriptions of these and other varieties are fully given in Shoesmith's "Study of Corn," and Bowman and Crossley's "Corn."

III. Life History of the Corn Plant

The life cycle. Every living thing has a life history —a beginning, a growing, possibly a reproduction, and a death. So it is with the corn plant. We may begin at any place in a cycle, but in the case of corn we shall begin with the seed. The young corn plant is already well started in the seed. It has a stem and leaf-end, embedded in a cotyledon containing food for the young plant as soon as conditions are right for it to continue its growth. We make these conditions right when we plant the kernel of corn in the soil. Here the moisture, warmth, and air cause the young plant in the cotyledon to begin to grow. This growth consists in putting out roots into the soil, pushing up a roll of leaves into the light and air, and using up the food in the kernel.

When the roots are established in the soil and the leaves are unfolded in the air, then the plant begins to feed upon the mineral food elements in solution in the soil and the carbon dioxide gas of the air, and to combine these food elements into compounds to be assimilated by the growing roots, stems, leaves, flowers and grain during the summer. At the tip of the corn stalk

the tassel containing millions of pollen spores develops, and on the side of the stalk the ear develops, each kernel of which sends out a long hollow silk thread to the end of the husks, where they appear in a beautiful yellow mass. The pollen must fall upon the silk, one spore upon the end of each silk, in which it grows a long tube reaching down the silk to the corn kernel at the cob. This fertilizes or gives life to the seed and the young corn plant begins to grow in the kernel and continues to grow until the kernel is matured. The old corn plant then dies and all that is left alive is the germs or new corn plants embedded in each kernel of the ripened ear of corn, ready to germinate and continue the life history another year as described above.

IV. The Corn Plant

Corn, a grass. All of the cereal grains except buckwheat belong to the family of grasses. Corn is a very wonderful grass. Until the tenth of May, or some time later, the corn plant is snugly folded within the kernel. From seven to fourteen days after the kernel is planted the young shoot pushes its tip out of the ground, and begins to be a real plant—a growing thing with roots in the ground and green leaves spreading out in the air. In another hundred days, or even less, the corn may be in the shock. What has happened meanwhile?

Corn roots. First, the corn plant had to develop and extend its root system deep and wide in the ground. It has been shown that in thirty days after planting the roots of corn plants in adjacent rows meet and interlace. They fill the whole surface of the corn field with a network of roots, and in many cases these roots

extend several feet downward. While the roots are reaching everywhere in the surface soil, the stalks are reaching upward and spreading out their broad blades to the sun and air. A corn stalk in the growing season contains a large amount of water. The water drawn from the soil by the roots is mixed and combined with the carbon taken in from the air by the leaves, making plant food out of raw elements of earth and air for the growth of the plant.

Leaves and blossoms. The corn plant does more than grow tall and strong. It prepares for storms by its system of brace-roots. It hangs its broad leaves in such a way that the wind may bend them and toss them with little danger of breaking them; the leaves are many, broad and long in order to give the corn plant enough feeding surface exposed to the sun and air. The corn plant has a wonderful contrivance for producing its fruit, as explained in a former paragraph. Silk and tassel are the flowers of the corn plant. Every future grain on the ear is at the lower end of a long thread of silk; but the grain can not develop until a particle of pollen from some tassel falls upon its tip and grows down the silk to fertilize the seed.

During its short growing season the corn plant may grow to a height of from six to fifteen feet and produce an ear or more of corn. A good ear of corn may contain a thousand or more kernels.

V. Place of Corn in Crop Rotation

Reasons for rotation. At the basis of all successful farming is an intelligent practice of crop rotation. Early in our study of corn, therefore, it is well to learn its place in systems of crop rotation.

A few of the special reasons for the rotation of crops are as follows:

1. Different crops make different demands on the soil. The grain crops are able to use a large part of the available phosphorus and potassium of the soil, but less of its nitrogen; therefore it is well to follow the grains with crops which use nitrogen more effectively without making such great demands upon the phosphorus and potassium supply.

2. Root systems differ. The small grains are shallow-rooted, and so use the fertility from the surface portion of the soil. Other crops, such as clover and alfalfa send their roots deep into the soil, and so secure plant food that is out of reach of such crops as wheat and oats. Besides, clover, alfalfa, and other leguminous crops when plowed under, leave the soil richer in nitrogen than they find it, thus making it ready for crops of a different character.

3. The culture of one crop prepares for a succeeding crop of a particular kind. It is common in the wheat sections to follow corn with wheat because summer cultivation of corn makes it possible to sow the wheat without plowing. Besides, the well-tilled corn ground enables the wheat to get a good start in the fall, and to make use of a considerable part of the plant food made available by weathering during the fall, winter, and spring.

4. The farmer who has a well-planned system of rotation is able to make better and more continuous use of his own time and of the labor of his men and teams.

Corn in systems of rotation. Rotation of crops will not in any sense add to the fertility of the soil, unless in the rotation a legume crop be returned to the soil.

In this way only nitrogen is added. In connection with the following rotations, discussion will be made later as to the place of mineral plant foods in keeping up soil fertility.

For a system of crop rotation in grain farming, the following scheme is advised:

(1) Wheat, (2) corn, (3) oats, (4) clover, and (5) one-fifth the land in alfalfa, to be turned into the rotation after five years and another one-fifth seeded to alfalfa. Sell all grains, seed, and alfalfa hay, and return the rest to the soil, using limestone and rock phosphate.

For a system of rotation in live-stock farming, the following is recommended:

(1) Corn, (2) corn, (3) oats, (4) clover, and (5) alfalfa as before. Feed all the crops and return the manure to the soil, using limestone and rock phosphate.

VI. Fertilizing Corn Ground

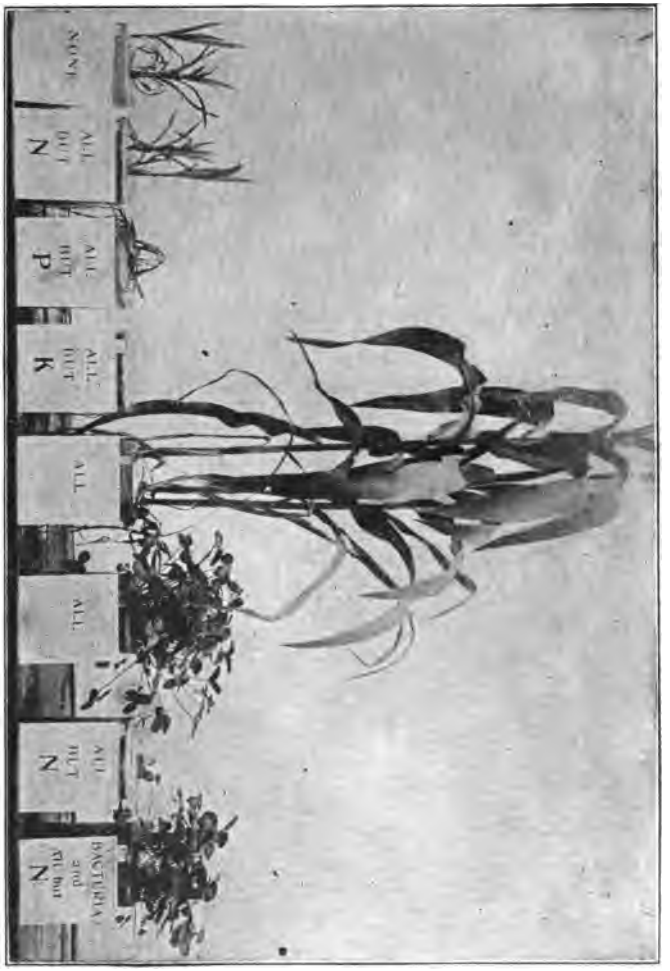
Corn not a poor land crop. It needs to be repeated again and again that corn can not be profitably raised on poor land. It costs as much to plow and otherwise prepare poor land for a crop of corn as it does to prepare good land; the subsequent cultivation is just as expensive, and every step in the progress of raising a poor crop from poor land is practically as costly as every similar step in producing a good crop from good land. Year after year some men raise corn on land so poor that, with the best cultivation, only a small crop can be raised and this always without profit. Why not bring the land up to the condition which will make it permanently profitable?

Soil upon which corn is to be grown often responds

with increased yields through crop rotation, the growing of clover, even though it be removed, and the use of complete commercial fertilizers, but these methods do not provide for permanent soil fertility, nor do they always return a profit on the investment.

Permanent soil fertility. There is a difference between adding complete commercial fertilizer even though increased crop yields result, and the maintenance of permanent soil fertility at a lesser annual yield. It is to be correctly inferred from the above that the use of complete commercial fertilizers does not maintain permanent soil fertility, and no one can deny that we should keep a permanent if not an increasing soil fertility.

How can this be done, is the practical question to raise. How can we feed the corn and keep the soil fertile? To begin at the beginning, let us take a typical Middle West acre. The first requirement is that the soil shall be well drained. The next is that it shall have plenty of active organic matter, such as crop residue, manures and clover in process of decay. If clover or other legumes will not grow well to furnish this organic matter, perhaps the soil is sour and needs from two to five tons of ground limestone to the acre. The next important requisite is the nitrogen supply in the soil. This is best supplied by the clovers which also furnish the organic matter. To get the addition of nitrogen the clover must be plowed under. The next requisite in most soils is the maintenance of an adequate phosphorus supply. This is most economically supplied by the use of from one to three tons of fine-ground rock phosphate to the acre. This must always be applied, however, to the clover which is to be turned under, or with manure or other organic



4. Plant Foods

matter incorporated in the soil, for the decaying of the organic matter sets free mild acids which help to dissolve the phosphorus in the rock phosphate and make it available for plant food. This decaying organic matter also renders available the potassium which in normal soils is present in sufficient quantities to supply standard yields. This method of supplying plant food to the soil in connection with good systems of crop rotation not only increases the annual yields of each crop in the rotation, but leaves the soil permanently richer in plant food, after the single applications described above have been made and the four or five crops of the rotation have been produced.

Plan of soil treatment, the corn series. The following is the general plan of soil treatment for ten plots in each of a series of five at the University of Illinois. The figures show the yields of corn in one season:

Plot No.	Soil Treatment	Corn Yield
1.	None	60
2.	Legume (catch crops and crop residues)	60
3.	Manure	75
4.	Legume, lime	65
5.	Manure, lime	80
6.	Legume, lime, phosphorus	87
7.	Manure, lime, phosphorus	90
8.	Legume, lime, phosphorus, potassium	90
9.	Manure, lime, phosphorus, potassium	93
10.	Legume (manure, lime, phosphorus, potassium, X5)*	96

*Five times the amounts used in 9 were applied.

VII. Plowing for Corn

Time of plowing. The time of plowing for corn will usually be determined by the convenience of the farmer. It is pretty well established that the differences in yield on land plowed in the fall and similar

land plowed early in the spring are very slight. Sticky clay land should not be plowed when it is so wet as to slip off the moldboard in a shiny condition. Land that is likely to wash because of steep hillsides, or other conditions, should be plowed late in the winter rather than early, especially if it is protected by a cover-crop.

Purpose of plowing. One purpose of plowing is to enable the land to store water; another is to enable it to retain water. Fall plowing provides for the storage of water in the soil; spring plowing provides for its retention. But this qualification needs to be added—that spring plowing is likely to hasten the evaporation of soil moisture unless the plow is almost immediately followed by the harrow. Water escapes very rapidly from the surface of a newly plowed field. Following the plow with the harrow while the surface soil is still fresh reduces the exposed surface and so retards evaporation. It also retards the rise of the water from the subsoil, thus retaining it where the plant roots will need it during the growing season. Another purpose of plowing is to open up and make available larger feeding areas for the plant roots.

Depth of plowing. The depth of plowing for corn will be determined largely by the depth of previous plowings. It is not wise to turn a large amount of raw subsoil up to the surface. Usually it is well to bring a small amount of new soil under the direct influence of sun and rain, thus preparing it to be useful to subsequent crops. It is to be remembered that it is the mellowed soil that contributes most to the growth of plants. Other influences have much to do with determining the proper depth of plowing for corn. If the ground is plowed in the fall, it may be safe to plow an

inch or more deeper than it would be wise to plow the same ground in the spring. The frosts and freezes of winter will do much to mellow and "tame" the soil that has never been exposed to the more active weathering influences.

If much organic matter is to be plowed under, that should be done in the fall, in order to give it time to decay before the spring crop is planted.

Preparation of seed bed. Broadly speaking, everything done to the soil is a part of the work of preparing the bed for the seed to be sown or planted. Plowing and fertilizing the ground are steps in the preparation of the seed bed, but we must be concerned here with the immediate preparation of the soil to receive the seed. The use of the harrow after the land has been plowed for corn is the simplest method of preparing for planting. On land plowed in the fall or early winter, it is advisable to go over the ground once or twice with the disk or cutaway harrow, before using the smoothing harrow; and in many cases the roller or wooden drag may follow the other implements with profit. A modern implement known as the "culti-packer" seems to make ideal seed bed preparation, since it both packs and mulches the soil. Finally, after the corn has been planted, further preparation of the soil for the growing corn may be made by going over it once or twice with the smoothing harrow. A seed bed in perfect condition to give the corn plants the best kind of start is almost equivalent to a guarantee of a good crop.

VIII. Testing Seed Corn

Will the corn grow? The farmer plants corn in the belief that it will grow. Why should not every kernel

sprout and produce a good stalk to bear a good ear? Perhaps it would if every condition is made right. The kernel itself is the first essential; it ought to be in perfect growing condition. The corn judge or the man selecting seed from the crib can not make a germinating test, he must be guided by appearances. What are some of the signs that corn will grow?

If the ear is firm in the hands, the kernels tight in their places, and no evidence of decay seen at the butt, it may be supposed that the corn is matured and well developed. The kernels should be hard and dry and without dullness of color; they should be of a fairly large and regular size, with large and healthy germs, and there should be no sign of mold. The tips of vigorous kernels are never thin and shrunken. There should be freedom from cracks and blisters, and tip caps should completely cover the tips of the shelled kernels. The cob should be dry, firm, and bright colored. A damp moldy cob indicates weakness in the germ, and it may mean that the germs are already dead.

The germination test. The final proof that the corn will grow is the germination test. The man who risks a large share of his year's labor in his corn field ought to be perfectly sure that his seed is good; the actual sprouting of a few grains from every ear will make him perfectly sure. (See methods of testing, page 28.)

Results of test. If any ear of corn shows less than perfect germination in every kernel taken, that ear should be discarded. It is not safe to plant seed from an ear that shows any weak or dead kernels. Perhaps the simplest and most important lesson to get from this study is that no one should plant corn that is not known by actual and careful test to be in per-

fect germinating condition. If seed corn has to be bought, it should be bought in the ear so that the purchaser may know what his corn is and may test it for himself.

IX. Planting the Corn

Time to plant. Early planting is generally advised, but corn is a warm weather plant. It will not germinate until the soil has become warmer than is necessary for the growth of peas, oats, and certain other hardy plants.

Distance in planting. The distance between rows is usually a matter of custom growing out of local experience. Forty-four inches is a common distance. If the corn is planted with a check-row planter it may be planted forty-four inches each way. When corn is drilled, the distance between rows is sometimes three feet and six inches. When planted in hills, and the seed is good, three kernels to the hill will produce the desired number of stalks.

Depth of planting. The depth of planting should depend on the season and the kind of soil and its condition. If the corn is planted early, while the soil is comparatively cold, shallow planting is to be recommended. When the soil has become warm and mellow, deeper planting may be safely done. It should be remembered that corn kernels will not sprout unless they get sufficient moisture, and at the surface of a dry soil there may not be enough moisture to cause prompt germination.

X. Cultivating Corn

Purposes of tillage. Tillage breaks up the soil, making possible the free movement of air and moisture.

It mellows and pulverizes the soil, thus promoting the processes that increase the availability of the plant-food materials. It promotes the warming of the earth. It destroys weeds.

First cultivation important. This first cultivation of the corn may be done with a two-horse double-shovel cultivator. Whatever implement is used should be supplied with fenders to keep the young plants from being covered or broken by the earth thrown against them.

The importance of this first cultivation can hardly be over-emphasized. It should not be done when the ground is too wet; it should not be put off until the weeds begin to smother the corn plants. Many a corn crop has been reduced in yield from a fourth to a half by neglecting to use the right implement in the right way at the right time.

Every man ought to be so familiar with his own soil and its condition that he can judge the right time to cultivate by looking at it, by walking over it, and by feeling of it with his fingers. If the ground is too wet, there is danger that serious harm will be done by the cultivator; if it is allowed to get too dry, there will be great loss of moisture due to evaporation and the growth of weeds.

Shallow cultivation. Much damage is done to corn every year by too deep cultivation. By the time corn is a foot high, it will not be possible to give it deep cultivation without breaking off many of the roots. This will give the corn a serious set-back.

With the plowing well done in fall or winter or early spring; with thorough preparation of the seed bed by the use of disk or cutaway and smoothing harrow and roller or plank drag; with one fairly deep

5. An Ideal Ear

cultivation well and carefully done, it is easy to do the work that will ordinarily assure a good crop of corn on fairly rich land. The subsequent cultivation should be shallow, in fact some growers advocate merely scraping the surface of the ground to destroy weeds and provide a soil mulch.

The soil mulch. By the use of the right kind of implements and a knowledge of the principles of tillage, the farmer keeps the soil in proper condition and prevents the growth of weeds. If a hard crust is formed on the surface of the soil by the dashing rains of summer, the soil water rapidly comes to the surface and is evaporated by the sun and wind. The farmer wants to have this water escape from the soil through the corn plants, giving up on the way the plant food it has dissolved out of the soil. He therefore breaks up the crust of earth and saves the moisture for the corn crop. The moisture from the deeper soil gathers below the mulch about the roots of the corn where it

can be utilized. If weeds are allowed to grow they will be sure to get their share of this moisture, thus robbing the corn.

XI. Maturing of Corn

Corn should mature. To be reasonably satisfactory for general use, corn must also get ripe. We want the corn to use the entire growing and ripening season; but we do not want it to be of a kind that needs two weeks more of growing weather than our climate can furnish. We want corn that will mature.

Large ears and maturity. The common disposition of farmers to select large ears has had a tendency to produce a strain of corn requiring a long season—a season longer than can be depended upon year after year; and so it often happens that, with a late spring or an early fall, or both, a large share of the corn does not get ripe. When cut before it matures, it is so full of water that it can not dry out before freezing weather. The result is that the frost kills or weakens the germs of the unripe corn, making it unfit for seed. Another effect of the imperfect ripening is seen in the many cribs of moldy corn. Whenever there is a large proportion of soft corn, there is great danger that there will be heating and subsequent molding in the crib.

Where to get seed. The fact needs frequent emphasis that it is not wise to bring seed corn from a distance. The corn plant has a tendency to adapt itself to the length of the season; but this adaptation does not come about in a single season. The best practice is to plant home-grown seed from soil similar to the soil in which it is to be planted. If good seed can not

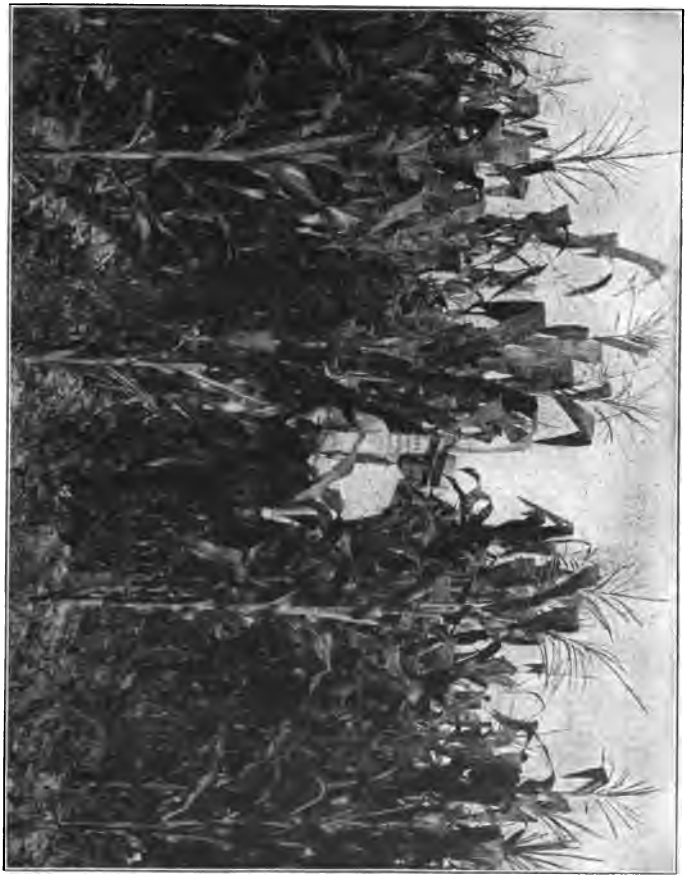
be had from near home, the grower will do well to send for seed grown where the season is shorter rather than longer than his own.

XII. Selecting Seed Corn in the Field

Value of good seed. The importance of selecting good seed corn and taking good care of it cannot be over-estimated. Experiments have shown that well-bred and carefully selected seed corn, of a type suited to the soil and climate where it is to be used, will increase the yield from 10 to 50 per cent. Rich soil and good culture are important factors in producing a large crop of corn, but good seed will add considerably to the yield.

Field selection. To get the best seed corn it should be selected in the field after it has matured, and while the character of the parent stalk can be seen. It is a well-known law of life that "like begets like," and in the case of corn, each kernel selected for seed will tend to produce a stalk and ear like the one from which it came. Now there are certain desirable characteristics of the stalk of corn, which can not be seen except by careful field selection.

There should be a large leaf growth. The stalk should be strong and vigorous, medium size, strong at the base with good brace roots and tapering gradually to the tassel. It should stand up well and bear its ear at a convenient height for husking. The shank of the ear should be of medium length allowing the ear to turn down slightly. A short shank holds the ear too erect. Ears on long shanks or too high on the stalk are more likely to pull down the stalk in a wind storm, besides being inconvenient to husk. The ears selected



6. Selecting Seed Corn

should be well developed, with straight rows, and kernels of uniform size. Ears should be selected and husked before the early frost injures them for seed. Expert plant breeders have selected seed corn for various characteristics and raised up new and different strains from the same seed. This shows that it is possible to select seed and thus improve the strain from the old stock.

XIII. Judging and Scoring Corn

Corn judging. The object of corn judging is to determine the corn of highest quality, either for feeding or market, which is consequently most profitable to grow. The study of the desirable characteristics of seed corn has led to the formation of a standard scale of points or "corn score card." By the use of the score card, the judge or student can keep in mind the relative merits of the points in a sample of corn, and compare the ears he is judging with the ideal standard.

In selecting corn for seed or for exhibition, probably the best method is to place the ears from a bushel of selected corn upon a table with the butts of the ears toward you. Select the most nearly perfect ear you can find, one which comes the nearest to the ideal type. Then select other ones resembling the first one—ten in all.

The score card. The score card is a device to help the judge or student to make intelligent comparisons of sample ears with the ideal type. The characteristics of the ear are listed and the perfect grade for each is given. The student must judge how nearly the sample being scored compares to the perfect grade under

each point. In judging corn, ten ears usually constitute an exhibit sample. It is desirable that samples be laid out side by side on a table where a good light may be had.

Caution. For practical work in corn scoring the teacher should provide score cards used and recommended by the Agricultural College of the state in which the work is being done. It is not advisable to give more attention and study to scoring corn than to its production. It is yield we want, rather than fancy ears, and this characteristic is often inherent in ears of indifferent appearance.

7. Corn Rack

XIV. Storing Seed Corn

Essentials of careful storing. The proper storing of seed corn after selection is perhaps of equal importance to the matter of selection. The ears should be taken when mature on the stalk and hung or laid in dry, well-ventilated places and kept perfectly dry and cool

until planting time the next season. It must be remembered that the seed is a living thing and is injured by freezing.

Value of careful storage. An Ohio Extension Bulletin reports as follows: "Samples of seed corn were taken from over 100 different farms in all parts of the state, and germination tests made of the corn to determine its vitality, careful record being kept, as far as possible, of the method of storing and caring for seed corn."

The following table will give the results as shown by this preliminary work:

	Number Tested	Range of Germination, Per Cent	Average Germination, Per Cent	Vigor of Plants
Taken from ordinary crib.....	40	55–100	85	Poor
Stored in good dry place with plenty of air currents, but no artificial heat, as on shelves in cribs, above wagon sheds, hung by wires, strings, etc..	62	72–100	90.3	Good
Stored in attics, empty rooms in houses, furnace rooms, etc. Some artificial heat furnished but not always a free circulation of air.....	11	85–100	93.3	Good

It was also shown in these Ohio experiments that seed corn from varieties that are well adapted to local climatic conditions, is less difficult to care for than from large, late-maturing strains.

"A bushel of seed corn will plant seven acres which at fifty bushels per acre should yield 350 bushels. It will be seen, according to the figures shown, that one bushel of the corn which had been well cared for, produces 5 per cent more stalks than the seed not properly

stored. Not taking into consideration the difference in the vigor of the plants, this would make a difference of seventeen and one-half bushels in favor of the bushel of seed that had been carefully handled."

Methods of storing seed corn. There are many methods of storing seed corn, but in all cases, the place of storing must be dry and well ventilated. It should never be put in boxes, barrels or sacks. The attic or an empty room upstairs in the house, if it is not too warm and close, is a good place for storing while the corn is still moist. The barn and crib are suitable places for storing, if there is time enough for the ears to become thoroughly dry before freezing weather. If thoroughly dry and surrounded by dry atmosphere, seed corn will stand very cold weather.

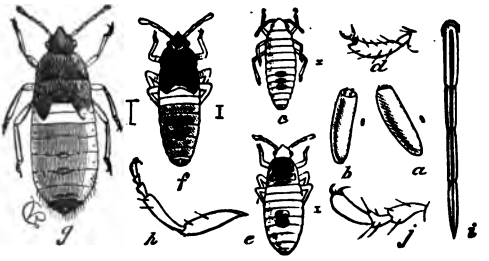
No matter where stored, the ears should be either hung up or placed on racks made of narrow strips with spaces between and in all cases kept out of reach of rats, mice and chickens.

XV. Some Insects Injurious to Corn

The corn root-louse. Corn attacked by this insect becomes dwarfed, the leaves turn red and yellow, and there is general lack of vigor. The root-louse is a small insect, bluish-green in color, oval in form, with two short slender tubes projecting from the back part of the abdomen. Root-lice are nearly always accompanied by ants, and the farmer who sees the ants about the roots of his corn, is likely to lay the blame of his sickly crop to them rather than to the root-lice, the real pests. The ants, however, are indirectly responsible for the root-louse injury, as they care for the eggs of the louse during the winter and bring the

young lice to the roots of the young smart-weeds early in the spring.

About the first of May the second generation of lice appears, and the little brown ants transfer them to the roots of the young corn plants. During the summer the lice continue breeding with great rapidity, all the while sucking the juice from the young roots of the growing corn. About the middle of September the last brood of females begin to lay eggs for the winter. These females are usually carried by the ants to their nests, where the eggs are laid.

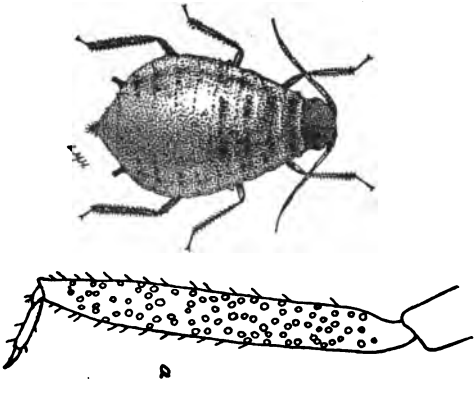


8. Chinch Bug

Rotation of crops, proper fertilization of the soil, deep fall plowing, or early spring plowing, followed by repeated deep disking to destroy the ants' nests, are some of the successful methods of combating the corn root-louse.

The chinch bug. The great arch enemy of the corn crop in many sections is the chinch bug. This insect is about one-tenth of an inch long and does its work of injury by sucking the juice from the stalks of the growing corn, completely destroying whole fields. The insect goes into winter quarters as an adult bug, and there remains until the warm weather of the next April or May. It is hidden away at

the roots of various grasses, and in accumulations of weeds, leaves and other rubbish. Many of them may be destroyed by burning such rubbish and grass. The bugs that live through the winter come out in the spring and spread over the country on the wing, settling in fields of wheat, early oats, or other grasses, and in these lay their eggs for the first generation of the year. The young hatching from these eggs injure the crop in which they find themselves. Later, at wheat harvest time, being only partly grown, they move out of infested wheat fields on foot into other fields of grain, especially of corn, where if the season favors them a second generation will be bred to the enormous injury of the infested crops.



9. Root-Louse

The successful combating of chinch bugs is a community affair. Every farmer who has chinch bugs on his place should clean up and burn all trash which would harbor them during the winter. In the summer the farmers of the community should all coöperate in throwing crude oil lines about their corn fields to

catch the bugs as they migrate from the wheat to the corn.

The corn ear-worm. The corn ear-worm injures the ears of corn and is a serious pest especially to sugar corn. In the South this same insect is known as the cotton boll-worm, from its habit of boring into the boll of the cotton.

In our latitude the first broods of the moths appear in May and deposit their eggs on corn or other food plants. The second or third broods lay their eggs in the silks or tassels of the corn. The young worms hatch in three or four days and begin feeding upon the silks of the corn. In a few days they get into the tips of the young ears. Each worm may feed upon several ears, and when full grown the worms leave the ear and go into the ground where they make little cells and in these transform to *pupae*. In about two weeks the next brood of moths appears. There are two or three broods in a year.

The pest is very difficult to combat. Since the pupae of the last brood hibernate in the ground during the winter, many of them may be killed by deep, late fall plowing. The time of planting should be taken into consideration; since the moths prefer to lay their eggs on the silks, the corn which is in silk when the moths emerge from the ground will be most seriously injured. Early planted corn is less liable to injury from this source.

XVI. Corn Products

The stalk. Many new uses have lately arisen for corn, in addition to the well known and standard purposes this cereal has long served. Pith from corn stalks has lately been utilized as a packing for battle-

ships. The production of cellulose, high explosives, varnishes, etc., are recent uses of pith, and in the manufacture the outer shell and leaves of the stalk are left as by-products. These are finely ground up and put on the market as the "New Corn Product," which is used as a stock food. The crude stalk has the well-known uses as fodder, ensilage, etc., as stock food. A cheap grade of paper can be made from the pulp of the corn stalk. Denatured alcohol and various food extracts are also being made from corn stalks.

10. Club Group

The corn kernel. Besides the common uses of the kernel as food for man and beast, there are about thirty products made from it: Six kinds of *mixing glucose,* used by refiners of table syrups, brewers, leather manufacturers, jelly makers, fruit preservers, and apothecaries; four kinds of *crystal glucose,* used by confectioners; two kinds of *grape sugar,* used by brewers and tanners; *pearl starch,* used by paper and cotton

facturers; *fluorine,* used by flour mixers; *dextrine,* used by fine fabric, paper box, mucilage and glue manufacturers; *corn-oil,* used by table oil mixers, lubricating oil mixers, manufacturers of fibre, shade cloth, paint, and similar industries where vegetable oils are employed; *corn-oil cakes,* used for cattle feeding purposes; *rubber substitute,* used in the place of crude rubber; *corn germs,* from which oil and cake are made; *British gum,* a starch which makes a very adhesive medium; *distilled spirits,* used in the manufacture of smokeless powder; *alcohol* for commercial purposes; *corn down,* the brown outer coating next the cob, used in the manufacture of mattresses.

The cob. Even the cobs, besides the emergency use as corks, are utilized in the manufacture of pipes, and as a fuel, in the great corn belt. The ashes of cobs are easily convertible into a commercial potash.

NOTEBOOK QUESTIONS

1. Why is corn sometimes called Indian corn or maize?

2. How does corn rank in acreage, production and value with other farm crops of the United States?

3. The corn crop for the last five years in the United States has been over 2,500,000,000 bushels a year. How much is that for each person in the United States?

4. How much corn was grown in your state last year? What was the average yield per acre? (See the *Year Book* of the Department of Agriculture, Washington, D. C. The school may obtain a copy through the congressman of the district.)

5. What are the parts of a kernel of corn?

6. What are the conditions for the germination of seed corn?

7. Where does the corn plant bear its blossoms?

8. A plot of ground at the University of Illinois has been in corn for thirty-five years. The yield is now about twenty-five bushels per acre. What does this show?

9. What do the farmers in your locality do to fertilize their corn ground?

10. In a system of crop rotation, including corn, oats, wheat and clover, a farmer desiring to establish permanent soil improvement applies two tons of ground limestone per acre to his clover field in the fall, and a

ton of finely ground rock sulphate in the spring, before turning under the clover for corn. The limestone cost $1.50 per ton and the rock phosphate $7.50 per ton. His corn yield, as shown by check plots, was five bushels more per acre the first season, and twenty-five bushels more the fifth season; the oats increased twenty-five bushels, the wheat fourteen bushels, and the clover one ton per acre. Estimating the expense of applying the limestone and rock phosphate at 50 cents per ton, what did he gain on the investment at the prevailing prices of grain and hay?

11. A farmer turned under a heavy clover crop in the spring of 1913 and planted the field to corn. The corn germinated and grew well for a few weeks, then dried up and died. Explain.

12. What is the purpose of the germinating test?

13. If an ear of corn has 800 kernels and each kernel should be planted and grow, producing ears that weighed 12 ounces each, how much should that ear of corn be worth, estimating its value from the yield at 50 cents a bushel?

14. What is the meaning of the term "tillage"? Name six values of tillage.

15. What should be done at the first cultivation of corn? Why is this cultivation so important?

16. Speak of the value of shallow cultivation as compared to deep cultivation of corn.

17. What harm results from weeds in the corn?

18. Why is it best to use home-grown seed?

19. Name some characteristics of the parent plant that are carried by the seed to the next generation.

20. Why is it best to select seed corn in the field? When should this be done?

APPENDIX

A Model Constitution for Boys' and Girls' Clubs[1]

CONSTITUTION

Article I. The name of this organization shall be the.....
.....Club.
(School, township, county, etc.)

Article II. The object of this club is to increase the agricultural, educational, and social advantages of.....
(Name of geographical unit)
through home projects, entertainments, lectures, fairs, exhibits, etc.

Article III. All boys and girls living in.....
(Geographical unit)
between the ages of 10 and 18 years shall be eligible for membership.

Article IV. Sec. 1. The officers of this club shall consist of a president, a vice-president, a secretary, and a treasurer.

Sec. 2. A majority vote shall constitute an election.

Article V. Roberts' Rules of Order shall govern the meetings of the club.

Article VI. The order of business for all regular meetings shall be as follows:

1. Call to order.
2. Roll call.
3. Reading of minutes of last meeting.
4. Addition or corrections to the minutes.
5. Reports of committees.
6. Old business.
7. New business.
8. Considering new names for membership.
9. Literary program.
10. Recreation or refreshments.
11. Adjournment.

Article VII. Committees for special purposes may be appointed by the president at any time.

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[1] Credit is due Mr. E. C. Lindemann, State Club Leader of Michigan, for this material.

BY-LAWS

Article I. The club motto shall be "To make the BEST, BETTER," and the club emblem shall be a four-leaf clover bearing an H on each leaf.

Article II. The officers shall be elected by ballot at the annual election in.....of each year.
(Month)

Article III. The regular meeting of the club shall take place at .....on the.....
(Name of building) (Day of the month)

Article IV. Sec. 1. A quorum shall consist of.....
(Usually two-thirds)
of the membership of the club.

Sec. 2. This constitution may be amended by a vote of .....of the members present at
(Two-thirds)
any regular meeting.

PARLIAMENTARY PRACTICE: HINTS AND SUGGESTIONS

a. Always address the president as Mr. or Miss President.

b. All remarks should be addressed to the president.

c. There should be no talking between members.

d. The president should recognize the person who seeks the floor by saying: "Mr. or Miss....."
(Person's name)

e. This indicates that the person thus recognized has the privilege of speaking (of the floor) and must not be interrupted.

f. The only interruptions allowable are (1) a call for a point of order, or (2) a question.

g. A point of order applies to a member who has made a motion which is out of order because of another motion before the meeting, or to a member whose remarks are not on the subject under consideration, or to a person who is exceeding the time limit for discussion, etc. A point of order is executed as follows:

Member rising while another is speaking: "Mr. President, I rise to a point of order."

The president will then recognize the speaker as follows: "Mr....., please state your point of order."

Member who has interrupted speaker: "Mr. President, the speaker, Mr....., is out of order because his
(Interrupted member's name)
remarks are not on the subject under consideration (or is out of order because there is another motion before the meeting)."

President: "The chair decides that the point is (or is not) well taken."

Whereupon the interrupted speaker takes his seat or makes an appeal from the decision of the chair as follows:

Interrupted speaker: "Mr. President, I appeal from the decision of the chair."

President: "Mr..... appeals from the decision of the chair. As many as are in favor of sustaining the decision of the chair will make manifest by saying 'Aye;' contrary-minded, 'No.'"

The motion is (or is not) carried.

If the motion is carried, and the decision of the chair is thus sustained, the interrupted speaker has no further recourse and must take his seat. If, however, the motion is lost and the decision of the chair is not sustained, the speaker may continue to speak.

Question. The speaker may be interrupted by any member for the purpose of asking a question. This question may be one of personal privilege or may be for the purpose of gaining information about the subject under discussion. The execution of this motion may proceed as follows:

Member taking floor while another member is speaking: "Mr. President, I rise to a question of information."

Presiding officer: "State your question."

Member: "Do I understand the speaker to mean that..... .....etc.?"

The speaker then proceeds to give the information desired, and the meeting proceeds.

In case of a question of personal privilege the process is as follows:

Member, rising and interrupting speaker: "Mr. President, I rise to a question of personal privilege."

Presiding officer: "State your question."

Member: "Mr. President, this room is too warm for comfort, and I therefore ask to have the windows opened."

In either case the presiding officer may rule for or against the person asking the question.

DUTIES OF OFFICERS

The President

1. Calls the meetings to order.
2. Announces the order of business.
3. Puts all questions and motions.

4. Decides points of order.
5. Decides the votes.
6. Calls another member to the chair if he or she wishes to take part in the debate.

The Vice-President

1. Performs all the duties of the president in case he or she is absent.

The Secretary

1. Keeps the minutes of all meetings.
2. Handles all correspondence.
3. Sends or posts notices for meetings.
4. Reads the minutes of the previous meetings.
5. Acts as chairman in case both president and vice-president are absent.

The Treasurer

1. Collects all dues and moneys.
2. Keeps an account of all moneys collected and paid out.
3. Pays bills when ordered by the president or secretary.

References on Corn

U. S. Department of Agriculture, Washington, D. C.

Farmers' Bul. 253 Germination of Seed Corn.
Farmers' Bul. 298 Food Value of Corn and Corn Products.
Farmers' Bul. 313 Harvesting and Storing of Corn.
Farmers' Bul. 414 Corn Cultivation.
Farmers' Bul. 415 Seed Corn.
Farmers' Bul. 537 How to Grow an Acre of Corn.

Books

Corn.—Bowman & Crossley.
The Corn Crops.—Montgomery.
The Corn Lady.—Fields.

The Home Project Notebook

Motto: To make the best better

CORN GROWING PROJECT RECORD

Year.....

Name .....

P. O..... Box..... Route.....

County .....

Name of Club.....

School Dist. No.....

Teacher .....

Club Leader.....

The student is urged to answer all questions, make all records, and describe all operations called for in the calendar of the monthly activities in the proper place in this notebook.

Draw on this page the plan of your farm. Show the location of the home, main fences, use of each field this year, and location of your corn plat.

Length.....rods Width.....rods

Area.....square rods or.....acres

3. Seed Corn Record

SPRING

Variety of corn planted.....

Where was seed grown?.....

Did you test the seed?.....

Per cent of germination.....

Date of planting.....

How planted (checkrowed, or drilled)?.....

Where planted (upland, slope, or valley)?

Kind of soil (sandy, loam, or clayey).....

Condition of ground (fall or spring plowed, or disked).....

Crop on this field last year.....

FALL

Date of harvesting seed.....Quantity.....bu.

Where and how stored for drying?.....

Date tested.....Per cent.....

Each time any work is done on your corn crop, make a record of it below. Begin this record with the first work done in getting the ground ready for this year's corn crop. Use one line for each kind of work. Make the record the day the work is done.

Value your time at 10c an hour and record same. Value all help at 17c. Value all horse labor at 10c an hour.

Date	Kind of Work	Hours	Value of Time		
			Value per Hour	Total	
	Total carried forward.....				

Date	Kind of Work	Hours	Value of Time		
			Value per Hour	Total	

Date	Kind of Work	Hours	Value of Time		
			Value per Hour	Total	

Date	Kind of Work	Hours	Value of Time		
			Value per Hour	Total	

Record here the value of fertilizer and seed corn used on your plat, and any other expense not shown in record of work.

Date	Material	Cost	
	Total	$	$

This record is for your whole corn plat. Enter separately each load or part of a load with the date on which same is husked. Include seed corn selected and husked before frost.

Date	Bushels	Date	Bushels	Date	Bushels

Total yield.....bushels. Cost of husking at 4c per bushel $.....

Date	To Whom Sold	Quantity	Price	Amt. of Sale	
	Total Sales				

Date	To Whom Sold	Quantity	Price	Amt. of Sale	
	Total Sales				

To be used if you have a rain gauge at home.

Date	Inches	How Long Raining?

A—RECEIPTS

SOLD

Seed corn .....bu. @.....	$.....
Corn (fed or sold)..bu. @.....	$.....

ON HAND

Seed corn .....bu. @..... (Estimated)	$.....
Corn .....bu. @..... (Market value)	$.....
Total bu.	$.....
Total value of corn produced.....	$.....

B—EXPENDITURES

Rent of land at 5 per cent on fair valuation	$.....
or landlord's share of crop.....bu.	$.....
Total cost of supplies.....	$.....
Hired labor @ 17c per hr.....	$.....
Horse labor @ 10c per hr.....	$.....
Total Expense	$.....

C—PROFIT

Total value of products.....	$.....
(Subtract) Total expense.....	$.....
Labor income	$.....
(Subtract) Labor @ 10 per hr..	$.....
Profit or loss.....	$.....

D—COST OF PRODUCTION

Total expense.....divided by total yield.....equals $..... cost of production per bushel.

E—RATE OF YIELD

Area or number of rows harvested and measured.....sq. rods or rows

Yield from such area or rows.....bu.

Total yield for the plat.....bu.

Rate of yield per acre.....bu.

Let each person outside your home family who visits your corn plat record his name.

Date	Name

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